

**CE 601– MSTE [Engr. Calaque, Dario Jr. A]**

**2<sup>ND</sup> QUIZ**

**INSTRUCTIONS:**

- a. CHEATING IS PROHIBITED! Mind your own paper. Any act of cheating (using of cellular phones, books, and lecture materials during examination, copying answers from your seatmate, etc.) will result to failure of examination.
  - b. No borrowing of calculator.
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**01.** A lighthouse at the edge of a cliff is due south of and in line with the three ships anchored at the bay. The farthest ship is 600 nautical miles from the 2<sup>nd</sup> ship while the nearest ship is 500 nautical miles from the lighthouse. The three ships are colinear with the position of the lighthouse. A naval boat approaches the position for the three ships but not in line with the positions of the three ships. The farthest boat and the 2<sup>nd</sup> boat subtend an angle of 30degrees from the naval boat, while that of the 2<sup>nd</sup> boat and the nearest boat to the lighthouse subtends an angle of 45degrees and the nearest boat and the lighthouse subtends an angle of 60degrees. Find the distance of the nearest ship from the 2<sup>nd</sup> ship.

**a) 255.5nm**

b) 366.6nm

c) 177.7nm

d) 444.4nm

**02.** Immediately after Mayon Volcano showed telltale sights of activity the PHIVOLCS set up stations to monitor the volcano. Two such stations were located at points A and B, 7km apart and on the same horizontal plane as the base of the volcano, B being closer to the volcano. From A, the angle of elevations of the top of Mayon Volcano is  $8^{\circ}$ . At the height of Mayon Volcano's wrath, the vertical smoke emitted from the volcano's crater subtended an angle of  $64^{\circ}$  on each stations A and B. Assuming the smoke and the two stations are on the same vertical plane, find the height of the smoke.

a) 38.45km

b) 37.89km

**c) 36.23km**

d) 35.55km

**03.** A Geodetic engineer wants to determine the height of the tower by observing a vertical angle at a certain point. He then moves a horizontal distance of 60m towards the tower at the same vertical plane with the tower and observes the vertical angle of the tower to be double that of the first. He resumes by moving further towards the tower at the same vertical plane with the tower at a distance of 20m and observes that the vertical angle of the tower is the complement of the first angle. Determine the height of the tower. Assume that the different points of observations and the base of the tower lies on the same horizontal plane.

**a) 44.72m**

b) 38.43m

c) 78.32m

d) 67.12m

**04.** A paver and a road roller are idly stationed on a straight stretched of a newly asphalted highway and are quietly a distance apart. A project office is situated 2km from the highway. The location of the project office, the paver and the roller lie incidentally on an imaginary circle of 6km radius. The sum of the square of the distance from the paver to the project office and the road roller to the project office is 52. Determine the distance between the paver and the road roller.

a) 8.06km

**b) 9.12km**

c) 10.32km

d) 4.22km

**05.** Find the area of a sector formed by drawing a chord 12m in length at a distance of 2.5m from the center of a circle.

a) 74. 83sq.m

b) 51. 45sq.m

**c) 49. 69sq.m**

d) 36. 93sq.m

**06.** A sight joining the two lighthouses on a shore is taken from a point P on a vertical cliff. The distance between the two lighthouses is 5km and the line is collinear with the point P. Two ships anchored on the bay are collinear with the point P and the bearing to this line is  $N45^{\circ}E$ . It takes 3minutes for a motor boat to go to the nearest boat and then 18minutes to the farthest boat. If the line joining the two lighthouses subtends an angle of 90degrees to each of the two ships, find the distance from P to the nearest ship. Find the distance from P to the nearest lighthouse.

a) 0.11km

b) 0.22km

**c) 0.33km**

d) 0.44km

**07.** The position of the lighthouse is equidistant from the destroyer battleship, flagship and the cruiser. The lighthouse is also collinear with the destroyer and the cruiser. If the distance between the destroyer and battleship is 3 nautical miles, between the battleship and the flagship is 4 nautical miles while that of the flagship and the cruiser is 5 nautical miles, determine the distance from the lighthouse to the cruiser.

a) 3.23 n.m

b) 7.48 n.m

c) 6.32 n.m

**d) 4.03 n.m**

**08.** Two chords are perpendicular to one another and both are at a distance 5m from the center of a 13m radius circle. Find the smallest area in the circle bounded by the chords.

a) **31.01sq.m**

b) 42.21sq.m

c) 28.11sq.m

d) 11.62sq.m

**09.** A cyclic quadrilateral has the sides  $AB = 8\text{cm}$ ,  $BC = 10\text{cm}$  and  $CD = 12\text{cm}$ . The fourth side  $DA$  forms the diameter of the circle. Determine the radius of the circle.

a) 12.95cm

b) 10.78cm

c) **10.04cm**

d) 12.06cm

**10.** An equilateral triangle with inscribed circle is drawn inside a circle whose radius is 2m. Another equilateral triangle with inscribed circle is drawn inside the smaller circle, and soon and so forth. Find the sum of perimeters of all triangles drawn.

a) 23.768m

b) **20.784m**

c) 18.904m

d) 27.604m

**11.** A road running tangentially to a circular lake is to have a branching at a point 1.5km before the tangent point and the branching, crossing the lake at an initial deflection angle of 60degrees to connect directly to a town on the lake's periphery. If the lake has a radius of 2km, how long a pontoon bridge will have to be designed?

a) 5km

b) 2km

c) 3km

d) **4km**

**12.** Find the side  $c$  of the spherical triangle:

Angle,  $A = 60^{\circ}30'$       Side,  $b = 38^{\circ}15'$       Side,  $a = 40^{\circ}30'$

a)  $77^{\circ}07'$

b)  $56^{\circ}04'$

c)  $58^{\circ}17'$

d)  **$46^{\circ}40'$**

13. The angle of elevation of a wireless telegraph tower is observed from a point on the horizontal plain on which it stands. At a point "a" nearer the angle of elevation is the complement of the former. At a point "b" nearer still the angle of elevation is double the first. Determine the height of the tower.

a)  $h = \left[ 2(a + b)^2 - \left( \frac{a}{2} \right)^2 \right]^{\frac{1}{2}}$

b)  $h = [(a + b)^2 - (a)^2]^{\frac{3}{2}}$

c)  $h = \left[ (a + b)^2 - \left( \frac{a}{2} \right)^2 \right]^{\frac{1}{2}}$

d)  $h = \left[ (a + b)^2 + \left( \frac{a}{2} \right)^2 \right]^{\frac{3}{2}}$

14. The measure of the interior angles taken in the order of a polygon from the arithmetic sequence. The least measurement in the sequence is  $85^\circ$ , the greatest measurement is  $215^\circ$ , what is the polygon.

a) Decagon

b) Nonagon

c) Undecagon

**d) Dodecagon**

15. Having a certain unknown distance measured and the angle of elevation of the cliff, a civil engineer walked 60m on a level towards the cliff. The angle of elevation from this second station was the complement of the former angle. The civil engineer then walks 20m nearer the cliff, on the same line and found the angle of elevation from the third station to be doubled the first angle. How high is the cliff?

a) 74.2m

b) 94.2m

c) 88.2m

d) 66.2m

16. Visitor near a certain national park can tune to a local radio station to find out about the activities that are happening in the park. The transmission tower for the radio station is along Park Road about 30 miles from the intersection of this road from a  $47^\circ$  angle. If a transmitter has a range of 25miles, how far along the interstate can the passengers in a car hear the broadcast?

a) 25.71miles

b) 22.54miles

c) 24.89miles

**d) 23.9miles**

17. A 25m diameter circle intersects another circle of unknown diameter. The points of intersection form a common chord 18m long. Center-to-center distance of the two circle is 17. Find the radius of the other circle.

- a) 12.26m
- b) 16.82m
- c) 10.48m
- d) 17.49m

18. Find the area of a spherical triangle ABC whose parts are:

Side,  $a = 23^{\circ}16'$

Side,  $b = 45^{\circ}19'$

Side,  $c = 50^{\circ}29'$

Radius,  $R = 220\text{ft.}$

- a) 8312.24sq.ft.
- b) 7312.24sq.ft.
- c) 6312.24sq.ft.
- d) 5312.24sq.ft.

19. A civil engineer desired to measure the height of a tower observing a vertical angle at A. He then moves 54m further towards the tower at B and observes another vertical angle which is twice that of the first. He again proceeds to move further towards the tower, still on the same line at distance of 21. The observed vertical angle of the tower at this point is three times that of the first. Determine the height of the tower.

- a) 55.4m
- b) 44.4m
- c) 22.4m
- d) 33.4m

20. Two towers AB and CD are of equal height. At a point between them in the line AC joining their bases, the angle of elevation of the nearer tower was observed to be 60degrees. Then at 24m from the same point in a direction perpendicular to AC, the angle of elevation of the top of the towers are 45degrees for the nearer tower and 30degrees for the other. Find the distance between the two towers.

- a) 54.2m
- b) 61.9m
- c) 72.6m
- d) 44.3m

21. How long will it take to fly from Manila ( $14^{\circ}30'N$ ,  $120^{\circ}40'E$ ) to Germany ( $30^{\circ}30'N$ ,  $40^{\circ}40'E$ ) if an airplane flew at a speed of 1500 statute miles per hour.

- a) 1.56hrs
- b) 2.75hrs
- c) 3.42hrs**
- d) 4.40hrs

22. The area of a regular polygon inscribed in a circle is to the area of the circumscribed regular polygon of the same number of sides as 7.5 is to 10. What is the regular polygon?

- a) Pentagon
- b) Hexagon**
- c) Heptagon
- d) Octagon

23. An observer at latitude  $41^{\circ}50'N$  made an observation of the sun and found out that its altitude is  $15^{\circ}40'$ . If the declination for that day was  $12^{\circ}30'$ , what was the time of the day if the observation is made in the morning?

- a) 6:09:38AM
- b) 6:49:58AM
- c) 6:29:18AM
- d) 6:39:48AM**

24. A 24meter pole is held by three guy wires in its vertical position. Two of the guy wires are of equal length. The third wire is 5meters longer than the other two and is attached to the ground 11meters farther from the foot of the pole than the two equal wires. Find the length of the longer wire.

- a) 40m
- b) 35m
- c) 30m**
- d) 25m

25. In the spherical triangle ABC, determine the side "a" with the following given data:

Side,  $b = 45^{\circ}48'$     Side,  $c = 180^{\circ}41'$     Angle,  $C = 90^{\circ}00'$

- a)  $159^{\circ}14'$**
- b)  $139^{\circ}14'$
- c)  $149^{\circ}14'$
- d)  $129^{\circ}14'$

-----Nothing Follows-----